CLMPTO

Cancel Claims 1-21; add 22 through 57

22. (Amended) An image coding apparatus comprising:

a bit plane generator (303) dividing unitary image data into a plurality of bit planes determined depending upon the number of bits forming each pixel,

an image preprocessor (305) connected to said bit plane generator (303) to arrange bit data of the same position forming said plurality of bit planes in close proximity to combine said plurality of bit planes into a single bit plane, and

a data compressor (306) connected to said image preprocessor (305) to compress an image of said single bit plane.

23. (New) The image coding apparatus according to claim 22, wherein said image preprocessor (305) extracts data sequentially one line at a time from said plurality of bit planes to combine said plurality of bit planes into a single bit plane.

24. (New) The image coding apparatus according to claim 22, wherein said data compressor (306) comprises

a composite plane data compressor (806) connected to said image preprocessor to compress an image of said single bit plane, and

a bit plane data compressor (806) connected to said image preprocessor to compress an image of each of said plurality of bit planes,

said image coding apparatus further comprising a data size comparator (809) connected to said composite plane data compressor and said bit plane data compressor to compare a data size of said single bit plane after image compression with a sum of a data size of each of said plurality of bit planes after image compression, and employing the data of smaller size as compressed data,

wherein said bit plane data compressor (806) and said composite plane data compressor (806) employ a common image compression method taking advantage of a correlation between pixels positioned in close proximity.

25. (New) An image coding apparatus comprising:

a bit plane generator (303) dividing unitary image data into a plurality of bit planes determined according to the number of bits forming each pixel,

an image preprocessor (305) connected to said bit plane generator (303) to combine said plurality of bit planes into a single bit plane so that pixels of high correlation belonging to different bit planes are pixels positioned in close proximity, and

a data compressor (306) connected to said image preprocessor (305) to compress an image of said single bit plane according to a compression method taking advantage of a high correlation between pixels positioned in close proximity.

26. (New) The image coding apparatus according to claim 25, wherein said image preprocessor (305) extracts data sequentially one line at a time from said plurality of bit planes to combine said plurality of bit planes into a single bit plane.

27. (New) The image coding apparatus according to claim 25, wherein said data compressor (306) comprises

a composite plane data compressor (806) connected to said image preprocessor to compress an image of said single bit plane, and

a bit plane data compressor (806) connected to said image preprocessor to compress an image of each of said plurality of bit planes,

said image coding apparatus further comprising a data size comparator (809) connected to said composite plane data compressor and said bit plane data compressor to compare a data size of said single bit plane after image compression with a sum of a data size of each of said plurality of bit planes after image compression, and employing the data of smaller size as compressed data,

wherein said bit plane data compressor (806) and said composite plane data compressor (806) employ a common image compression method taking advantage of a correlation between pixels positioned in close proximity.

28. (New) An image coding apparatus comprising:

an image preprocessor (1503) arranging bit data of the same position forming a plurality of image data input continuously in close proximity to combine said plurality of image data into unitary image data, and

a data compressor (1504) connected to said image preprocessor (1503) to compress an image of said unitary image data.

29. (New) An image decoding apparatus decoding data compressed by the image coding apparatus recited in claim 22, comprising:

a data decompressor (402) decompressing said data to a single bit plane,

an image postprocessor (403) connected to said data decompressor (402) to decompose said single bit plane combined by arranging bit data of the same position forming a plurality of bit planes in close proximity into said plurality of bit planes, and

a bit plane integrator (405) connected to said image postprocessor (403) to integrate said plurality of bit planes into image data with a value of each pixel of said plurality of bit planes as a bit value of each pixel.

30. (New) An image decoding apparatus decoding data compressed by the image coding apparatus recited in claim 25, comprising:

a data decompressor (402) decompressing said data to a single bit plane,

an image postprocessor (403) connected to said data decompressor (402) to decompose said single bit plane combined so that pixels of high correlation belonging to different bit planes are pixels positioned in close proximity into said plurality of bit planes, and

a bit plane integrator (405) connected to said image postprocessor (403) to integrate said plurality of bit planes into image data with a value of each pixel of said plurality of bit planes as a bit value of each pixel.

31. (New) An image decoding apparatus decoding data coded by the image coding apparatus recited in claim 24, comprising:

a data decompressor (402) decompressing said data to a single bit plane,

a data type determiner (903) connected to said data decompressor (402) to determine whether the single bit plane decompressed by said data decompressor (402) is a bit plane corresponding to a plurality of bit planes compressed after being combined into a single bit plane or a bit plane corresponding to a plurality of bit planes compressed individually.

an image postprocessor (403) connected to said data type determiner (903) to selectively execute whether to decompose said single bit plane into a plurality of bit planes based on an output of said data type determiner (903), and

a bit plane integrator (405) connected to said image postprocessor (403) to integrate said plurality of bit planes into image data with a value of each pixel of said plurality of bit planes as a bit value of each pixel,

wherein said data decompressor (402) employs a common image decompression method regardless of whether said single bit plane corresponds to data of a plurality of bit planes combined into a single bit plane or a bit plane corresponding to a plurality of bit planes compressed individually.

32. (New) The image decoding apparatus according to claim 31, wherein said data type determiner (903) determines whether the decompressed single bit plane is a bit plane corresponding to a plurality of bit planes compressed after being combined into a single bit plane based on a comparison result between a horizontal width or vertical width of the composite plane and the horizontal width or vertical width of an original image.

33. (New) An image decoding apparatus decoding data compressed by the image coding apparatus recited in claim 28, comprising:
a data decompressor (1602) decompressing said data into unitary image data, and
an image postprocessor (1603) connected to said data decompressor (1602) to decompose said unitary image data combined by arranging bit data of the same position forming a plurality of image data in close proximity into said plurality of image data.

34. (New) An image coding method comprising the steps of:
dividing unitary image data into a plurality of bit planes determined depending on the number of bits forming each pixel (S1002),
arranging bit data of the same position forming said plurality of bit planes in close proximity to combine said plurality of bit planes into a single bit plane (S1003), and
compressing an image of said single bit plane (S1004).

35. (New) The image coding method according to claim 34, wherein said step of combining (S1003) comprises the step of extracting data sequentially one line at a time from said plurality of bit planes to combine said plurality of bit planes into a single bit plane (S1003).

36. (New) The image coding method according to claim 34, wherein said step of compressing an image (S1004) comprises the steps of

compressing an image of said single bit plane (S1205), and

compressing an image of each of said plurality of bit planes (S1203),

said method further comprising the step of comparing a data size of said single bit plane after image compression with a sum of the data size of each of said plurality of bit planes after image compression, and employing data of the smaller size as compressed data (S1206-1208),

wherein a common image compression method taking advantage of a correlation between pixels positioned in close proximity is used regardless of whether said single bit plane corresponds to data of a plurality of bit planes combined into a single bit plane or a bit plane corresponding to a plurality of bit planes compressed individually.

37. (New) An image coding method comprising the steps of:

dividing unitary image data into a plurality of bit planes determined depending on the number of bits forming each pixel (S1002),

combining said plurality of bit planes into a single bit plane so that pixels of high correlation belonging to different bit planes are pixels positioned in close proximity (S1003), and

compressing an image of said single bit plane by a compression method taking advantage of a correlation between pixels positioned in close proximity (S1004).

38. (New) The image coding method according to claim 37, wherein said step of combining (S1003) comprises the step of extracting data sequentially one line at a time from said plurality of bit planes to combine said plurality of bit planes into a single bit plane (S1003).

39. (New) The image coding method according to claim 37, wherein said step of compressing an image (S1004) comprises the steps of

compressing an image of said single bit plane (S1205), and

compressing an image of each of said plurality of bit planes (S1203),

said image coding method further comprising the step of comparing a data size of said single bit plane after image compression with a sum of the data size of each of said plurality of bit planes after image compression, and employing data of the smaller size as compressed data (S1206-1208),

wherein a common image compression method taking advantage of a correlation between pixels positioned in close proximity is used regardless of whether said single bit plane corresponds to data of a plurality of bit planes combined into a single bit plane or a bit plane corresponding to a plurality of bit planes compressed individually.

40. (New) An image coding method comprising the steps of:

arranging bit data of the same position forming a plurality of image data input continuously in close proximity to combine said plurality of image data into unitary image data (S1702), and

compressing an image of said unitary image data (S1703).

41. (New) An image decoding method of decoding data compressed by the image coding method recited in claim 34, said method comprising the steps of:

decompressing said data to a single bit plane (S1101),

decomposing said single bit plane combined by arranging bit data of the same position forming a plurality of bit planes in close proximity into said plurality of bit planes (S1102), and

integrating said plurality of bit planes into image data with a value of each pixel of said plurality of bit planes as a bit value of each pixel (S1103).

42. (New) An image decoding method of decoding data compressed by the image coding method recited in claim 37, comprising the steps of:

decompressing said data to a single bit plane (S1101),

decomposing said single bit plane combined so that pixels of high correlation belonging to different bit planes are pixels positioned in close proximity into said plurality of bit planes (S1102), and

integrating said plurality of bit planes into image data with a value of each pixel of said plurality of bit planes as a bit value of each pixel (S1103).

43. (New) An image decoding method of decoding data coded by the image coding method recited in claim 36, comprising the steps of:

decompressing said data to a single bit plane (S1101),

determining whether the decompressed single bit plane corresponds to data of a plurality of bit planes combined into a single bit plane or a bit plane corresponding to a plurality of bit planes compressed individually (S1304),

selectively executing decomposing said single bit plane into a plurality of bit planes based on a determination result (S1102, S1305), and

integrating said plurality of bit planes into image data with a value of each pixel of said plurality of bit planes as a bit value of each pixel (S1103),

wherein said step of decompressing (S1101) employs a common image decompression method regardless of whether said single bit plane corresponds to data of a plurality of bit planes combined into a single bit plane or a bit plane corresponding to a plurality of bit planes compressed individually.

44. (New) The image decoding method according to claim 43, wherein said step of determining (S1304) determines whether the decompressed single bit plane is a bit plane corresponding to a plurality of bit planes compressed after being combined into a single bit plane based on a comparison result between a horizontal width or vertical width of the composite plane and the horizontal width or vertical width of an original image.

45. (New) An image decoding method of decoding data compressed by the image coding method recited in claim 40, comprising the steps of:

decompressing said data to unitary image data (S1801), and

decomposing said unitary image data combined by arranging bit data of the same position forming a plurality of image data in close proximity into said plurality of image data (S1802).

46. (New) A computer-readable recording medium recorded with an image coding program causing a computer to execute the steps of:

dividing unitary image data into a plurality of bit planes determined depending on the number of bits forming each pixel (S1002),

arranging bit data of the same position forming said plurality of bit planes in close proximity to combine into a single bit plane (S1003), and

compressing an image of said single bit plane (S1004).

47. (New) The computer-readable recording medium according to claim 46, wherein said step of combining (S1003) comprises the step of extracting data sequentially one line at a time from said plurality of bit planes to combine said plurality of bit planes into a single bit plane (S1003).

48. (New) The computer-readable recording medium according to claim 46, wherein said step of compressing an image (S1004) comprises the steps of

compressing an image of said single bit plane (S1205), and

compressing an image of each of said plurality of bit planes (S1203),

said image coding program further comprising the step of comparing a data size of said single bit plane after image compression with a sum of the data size of each of said plurality of bit planes after image compression, and employing data of the smaller size as compressed data (S1206-1208),

wherein a common image compression method taking advantage of a correlation between pixels positioned in close proximity is used regardless of whether said single bit plane corresponds to data of a plurality of bit planes combined into a single bit plane or a bit plane having a plurality of bit planes compressed individually.

49. (New) A computer-readable recording medium recorded with an image coding program causing a computer to execute the steps of:

dividing unitary image data into a plurality of bit planes determined depending on the number of bits forming each pixel (S1002),

combining said plurality of bit planes into a single bit plane so that pixels of high correlation belonging to different bit planes are pixels positioned in close proximity (S1003) and

compressing an image of said single bit plane by a compression method taking advantage of a correlation between pixels positioned in close proximity (S1004).

50. (New) The computer-readable recording medium according to claim 49, wherein said step of combining (S1003) comprises the step of extracting data sequentially one line at a time from said plurality of bit planes to combine said plurality of bit planes into a single bit plane (S1003).

51. (New) The computer-readable recording medium according to claim 49, wherein said step of compressing an image (S1004) comprises the steps of

compressing an image of said single bit plane (S1205), and

compressing an image of each of said plurality of bit planes (S1203),

said image coding program further comprising the step of comparing a data size of said single bit plane after image compression with a sum of the data size of each of said plurality of bit planes after image compression, and employing data of the smaller size as compressed data (S1206-1208),

wherein a common image compression method taking advantage of a correlation between pixels positioned in close proximity is used regardless of whether said single bit plane corresponds to data of a plurality of bit planes combined into a single bit plane or a bit plane having a plurality of bit planes compressed individually.

52. (New) A computer-readable recording medium recorded with an image coding program causing a computer to execute the steps of:

arranging bit data of the same position forming a plurality of image data input

continuously in close proximity to combine said plurality of image data into unitary image data

(S1702), and

compressing an image of said unitary image data (S1703).

53. (New) A computer-readable recording medium recorded with an image decoding

program of decoding data compressed by executing the image coding program recited in claim

46, said computer-readable recording medium recorded with the image decoding program

causing a computer to execute the steps of:

decompressing said data to a single bit plane (S1101),

decomposing said single bit plane combined by arranging bit data of the same position

forming a plurality of bit planes in close proximity into said plurality of bit planes (S1102), and

integrating said plurality of bit planes into image data with a value of each pixel of said

plurality of bit planes as a bit value of each pixel (S1103).

54. (New) A computer-readable recording medium recorded with an image decoding

program of decoding data compressed by executing the image coding program recited in claim

49, said computer-readable recording medium recorded with the image decoding program

causing a computer to execute the steps of:

decompressing said data to a single bit plane (S1101),

decomposing said single bit plane combined so that pixels of high correlation belonging

to different bit planes are pixels positioned in close proximity into a plurality of bit planes

(S1102), and

integrating said plurality of bit planes into image data with a value of each pixel of said

plurality of bit planes as a bit value of each pixel (S1103).

55. (New) A computer-readable recording medium recorded with an image decoding

program of decoding data compressed by executing the image coding program recited in claim

48, said computer-readable recording medium recorded with the image decoding program

causing a computer to execute the steps of:

decompressing said data to a single bit plane (S1101),

determining whether the decompressed single bit plane is a bit plane corresponding to a plurality of bit planes compressed after being combined into a single bit plane or a bit plane corresponding to a plurality of bit planes compressed individually (S1304),

selectively executing decomposing said single bit plane into a plurality of bit planes based on a determination result (S1102, S1305), and

integrating said plurality of bit planes into image data with a value of each pixel of said plurality of bit planes as a bit value of each pixel (S1103),

wherein said step of decompressing (S1101) employs a common image decompression method regardless of whether said single bit plane corresponds to data of a plurality of bit planes combined into a single bit plane or a bit plane corresponding to a plurality of bit planes compressed individually.

56. (New) The computer-readable recording medium according to claim 55, wherein said step of determining (S1304) determines whether the decompressed single bit plane is a bit plane corresponding to a plurality of bit planes compressed after being combined into a single bit plane based on a comparison result between a horizontal width or vertical width of the composite plane and the horizontal width or vertical width of an original image.

57. (New) A computer-readable recording medium recorded with an image decoding program of decoding data compressed by executing the image coding program recited in claim 52, said computer-readable recording medium recorded with the image decoding program causing a computer to execute the steps of:

decompressing said data to unitary image data (S1801), and

decomposing said unitary image data combined by arranging bit data of the same position forming a plurality of image data in close proximity into said plurality of image data (S1802),